SMALL BUSINESS ECONOMIC IMPACT STATEMENT: CHOLINESTERASE MONITORING IN AGRICULTURE PROPOSED WAC 296-307-148 (Part J-1)

JULY 9, 2003

Contents

EXECUTIVE SUMMARY

Background

If adopted, this proposed rule would require employers of agricultural pesticide handlers using toxicity category I or II organophosphate or N-methyl-carbamate cholinesterase-inhibiting pesticides ("covered pesticides" from this point forward) to take the following steps:

- To record the number of hours employees spend handling covered pesticides;
- To provide training regarding covered pesticides and medical monitoring to employees handling covered pesticides above a designated level;
- To make medical monitoring available to employees handling covered pesticides above a designated level.
- To make such monitoring and training available to employees handling covered pesticides more than 50 hours in any consecutive 30-day period the first year, and to employees handling such pesticides more than 30 hours beginning the second year;
- To investigate work practices when a handler's red blood cell (RBC) or plasma cholinesterase level drops more than 20 percent below the employee's personal baseline;
- To remove an employee handling covered pesticides from exposure when his or her RBC cholinesterase level drops more than 30 percent below the personal baseline or plasma cholinesterase level drops more than 40 percent below the personal baseline (and until levels return to within 20 percent of the personal baseline);
- To protect an employee's wages and benefits for up to three months if an employee is removed from exposure.

The rule also specifically provides for a review of experience after the first year to determine whether the second-year thresholds should be adjusted, and a further review after the first year to determine whether any other adjustments should be made.

The Department of Labor and Industries (L&I) has initiated this rulemaking as required by the Supreme Court of the State of Washington in *Juan Rios and Juan Farias v. Washington Department of Labor & Industries, et al*., 145 Wn.2d 483, 39 P.3d 961 (2002). In preparing this proposal, L&I worked with a stakeholder advisory group consisting of agriculture worker representatives, growers, other government agencies, and scientific community representatives. L&I also conducted public meetings around the state to gather information.

Overall Impact

Overall, L&I expects the recordkeeping requirements of the rule to apply to an estimated 4800 handlers employed by 1700 businesses. Of these, the rule will require that medical monitoring be offered to an estimated 1100 handlers in the first year and an estimated 3000 handlers beginning in the second year. The department estimates a total cost of just over $925 thousand for the first year and just over $2 million beginning in the second year. After adjusting the costs for each year to reflect the current value of the money (the "net present value") to provide a consistent basis for comparison, the total two-year cost of the rule for all affected employers will be an estimated $2.8 million.

Analysis for Disproportionate Impact on Small Business

To examine possible disproportionate impacts on small businesses affected by the proposed rule, L&I analyzed the rule's effect on employers *who used the covered pesticides* in three categories, identified using Standard Industrial Classifications (SIC): Professional applicators (SIC 0721); orchardists (SIC 0175); and other growers (SIC 0111, 0115, 0119, 0134, 0139, 0161, 0171, 0172,

0811). In each case, L&I relied upon data from an employer survey and other available information to develop the most likely cost estimate, located centrally within a range of possible costs.

L&I then compared the estimated costs to small employers with the costs to the largest 10 percent of employers within each industry sector to identify any disproportionate economic impacts.[1]

Table 1 summarizes the findings of the Small Business Economic Impact Statement, which is described in more detail beginning on page 3.

Table 1: Central Cost Estimates by Industry Sector

	First Year		Second Year	
	Per Firm	**Per Handler**	**Per Firm**	**Per Handler**
Professional Applicators				
Small Business	$892	$517	$1218	$706
Largest 10 Percent	$4532	$504	$5511	$612
Small +/- Larger		+2.6%		+15.4%
Orchardists				
Small Business	$346	$169	$956	$466
Largest 10 Percent	$1786	$205	$4034	$463
Small +/- Larger		-17.6%		+0.6%
Other Growers				
Small Business	$217	$165	$315	$239
Largest 10 Percent	$553	$144	$1023	$267
Small +/- Larger		+14.6%		-10.5%

Based on this information, there appears to be a disproportionate impact on small business in the professional applicator sector, beginning in the second year (although the combined two-year net present value analysis of the impact is less conclusive, as discussed in more detail in the "Conclusions" section that begins on page 16). In the Other Growers sector, there is a disproportionate impact in the first year alone, apparently because of a relatively small distribution of small businesses who are moderate users of the covered pesticides. However, from the second year forward, the relative impact is greater on large businesses in the Other Growers sector. In Orchards, there does not appear to be a large enough variation to describe it as a disproportionate impact.

Because L&I recognized the possibility of a disproportionate impact in one or more sectors, the proposed rule contains several mitigations to reduce the impact of the rule on small businesses without compromising worker protection. In addition to the mitigations reflected by the rule proposal itself, L&I will take additional steps to further mitigate the impacts. Both sets of mitigations are outlined in the "Conclusions" section.

In two of the industry sectors (Orchardists and Other Growers), the relative impact on small business would be substantially lower if the analysis reflected those businesses who do not use covered pesticides and therefore will not be affected by the rule in any way.

[1] In each industry sector, some small businesses also fell within the largest 10 percent. In those cases, the business was excluded from the small employer group in order to avoid distorting the comparison by including the same business in both samples.

BACKGROUND INFORMATION

In the context of this analysis and unless clearly used otherwise, "pesticide" refers to toxicity category I or II organophosphate or N-methyl-carbamate cholinesterase-inhibiting pesticides and "handler" refers to any employee who is a pesticide handler as defined in WAC 296-307-11005 (the pesticide Worker Protection Standard) and who is handling such pesticides.

Previous Regulatory and Legal Activity. In 1993, after evaluating the feasibility and benefits of cholinesterase monitoring coupled with the protections then being adopted as part of the pesticide Worker Protection Standard (WAC 296-307-107, known as Chapter 296-307, Part I), the Washington State Department of Labor & Industries (L&I) adopted a recommendation for cholinesterase monitoring in agriculture (WAC 296-307-14520). The recommendation included baseline and periodic red blood cell (RBC) and plasma cholinesterase testing for workers handling organophosphate or N-methyl-carbamate pesticides for 30 or more hours in any 30-day period.

In 1997, L&I was asked to require cholinesterase monitoring. L&I declined to do so, leading to legal action to require L&I to act. In 2002, the Supreme Court of the State of Washington required L&I to initiate such rules in *Juan Rios and Juan Farias v. Washington Department of Labor & Industries, et al.,* 145 Wn.2d 483, 39 P.3d 961 (2002). This proposed rule is a result of that decision. To assist in the development of this proposal, L&I formed an advisory group consisting of agriculture worker representatives, growers, other government agencies, and scientific community representatives. L&I also conducted public data-gathering meetings around the state. Both the public meetings and the grower associations included on the advisory group included representatives of small businesses that would be affected by the proposed rule.

Cholinesterase-Inhibiting Pesticides. Organophosphate and N-methyl-carbamate pesticides act to inhibit the activity of the enzyme acetylcholinesterase (AChE). AChE aids in regulation of the nervous system by removing the neurotransmitter acetylcholine from neuronal junctions and target receptor sites (for example, a muscle or gland). Exposure to these pesticides can lead to an accumulation of acetylcholine that could result in the over-stimulation of an individual's nervous system. Common symptoms of such cholinergic poisoning include increased sweating, blurred vision, diarrhea, tremors and malaise. Severe exposures may result in pulmonary edema, respiratory distress, seizures, loss of consciousness, and death.

Organophosphate and N-methyl-carbamate pesticides share a common mechanism of toxicity. Both bind with AChE and prevent destruction of acetylcholine. The major difference between organophosphate and N-methyl-carbamate pesticides is that the phosphate bond persists for days and may become permanent, while the carbamate bond may last for as little as 30 minutes to 24 hours. In general, regeneration (replacement) of permanently bound AChE is measured at the rate that AChE is synthesized in the blood stream (approximately 1% per day.)

While the inhibition of AChE by organophosphate pesticides lasts much longer, the physiologic consequences of poisoning by organophosphate and N-methyl-carbamate pesticides are the same. Overlapping exposures to the two categories of pesticides can result in an accumulation of toxic effects. Symptoms of poisoning are often self-limited, with normal function returning as bound AChE regenerates and new enzyme is synthesized in the body.

Cholinesterase Monitoring. Cholinesterase monitoring most commonly involves measuring the activity of both red blood cell (RBC) and plasma cholinesterase. Both enzymes have been shown to act as surrogates for AChE activity in the nervous system. RBC cholinesterase is the same AChE found in the nervous system and is thought to better reflect effects on nervous

system AChE than plasma cholinesterase. Monitoring both RBC and plasma cholinesterase enzymes provides a more complete clinical picture of exposure to covered pesticides.

Exposure to cholinesterase-inhibiting pesticides also can be evaluated by direct measurement of pesticide in the blood or by measuring pesticide metabolites in the urine. Both methods present problems that make them less desirable monitoring methods. Urine metabolites begin being secreted in the urine almost immediately and may disappear within 48-72 hours. Detection of pesticides in the blood requires specific laboratory assays for each pesticide, thus requiring many different analytical methods. While both methods detect pesticide exposure, neither provides information on worker's physiologic response. Given the limitations of other monitoring methods, measurement of blood cholinesterase levels provides the most practical and efficient method for monitoring cholinesterase activity and identifying possible overexposures. However, the limitations of this method require that certain practical considerations be addressed.

Blood cholinesterase measurement is subject to intra- and interpersonal variability. Because of expected intrapersonal variability, the proposed rule does not require a response until a meaningful reduction has been identified. Because of inter-personal variability, there is no "normal" cholinesterase level. This means that effective monitoring depends upon a periodic comparison of an individual's cholinesterase levels to a personal baseline value established for that individual prior to exposure.

Several laboratory methods for measuring cholinesterase activity levels are available. Of these, the electrometric and colorimetric methods are most often used. Both methods are effective for RBC and plasma cholinesterase testing. Because these methods use different systems to report results it is difficult to compare tests between methodologies. Even though there are conversion equations available between different reporting systems, these equations are not always reliable. For this reason, the proposed rule addresses this issue by requiring that the same laboratory using the same method analyze each individual's baseline and periodic tests.

SUMMARY OF THE PROPOSED RULE

All analysis and conclusions contained in this Small Business Economic Impact Statement are based on the following requirements of the proposed rule:

1. The employer will be required to keep records of all employee handling of covered pesticides, and retain those records for seven years.
2. Cholinesterase monitoring (RBC and plasma cholinesterase) will be required for employees who handle covered pesticides for 50 or more hours in any consecutive 30-day period beginning January 15, 2004, and for 30 or more hours in any consecutive 30-day period beginning January 15, 2005.
3. Employers will be required to ensure that employees requiring medical monitoring will receive training that includes at a minimum:
    - The human health hazards associated with exposure to organophosphate and N-methyl-carbamate pesticides
    - The purpose and requirements of cholinesterase monitoring.
4. Employers will identify a medical provider to provide (at no cost to the employee, and at a reasonable time and place) baseline and periodic testing, interpretation of test results, and recommendations resulting from those test results
5. Employees may choose to decline cholinesterase testing after receiving training and consulting with the medical provider.

6. Pre-exposure baseline testing will be conducted annually.
7. Employers whose employees handle only N-methyl-carbamate pesticides will be exempt from the requirement to offer those employees cholinesterase testing.
8. Hours spent mixing and loading using closed systems (as described in WAC 296-307-13045(4)(d)) will not be counted as exposure hours for the purposes of periodic testing, but will be included for the purposes of baseline testing.
9. Periodic testing will be required within 3 days of meeting the designated exposure thresholds or at least every 30 days while exposure is expected to exceed thresholds.
10. Cholinesterase depressions will require the following employer actions:
    - A depression of more than 20% from the employee's personal baseline will require the employer to conduct a work practice investigation
    - An RBC cholinesterase depression of more than 30% or more from the personal baseline or a plasma cholinesterase depression of more than 40% from the personal baseline will require the employee to be temporarily removed from organophosphate and N-methyl-carbamate exposure and the employer to conduct a work practice investigation.
    - An employee removed from exposure will not be allowed to return to handling covered pesticides until his or her cholinesterase levels are within 20 percent of the personal baseline.
11. Medical removal protection, for up to 3 months, will be made available to employees removed from handling duties due to cholinesterase depression.
12. The employer must maintain (or contract with the provider to maintain) monitoring and related medical records for 7 years.

The proposed rule would be part of the Agriculture Standard adopted under the Washington Industrial Safety and Health Act (WISHA)[2] and, as such, would apply to all agricultural activity in the state where covered pesticides are used.

EMPLOYER SURVEY

The department designed a survey instrument to help ascertain the probable impacts of the proposed rule. The Washington State Department of Agriculture (WSDA) was consulted to determine the types of crops where use of the pesticides in question was most prevalent in order to focus the survey on selectively targeted industry sectors. The firms in each sector were identified from L&I's workers' compensation database using a random sample in each of the affected industries. The industries targeted in the survey, with their associated standard industrial classification (SIC), are as follows:

- SIC 0134 All potatoes except yams.
- SIC 0139 Field crops: hay, alfalfa, hops, mint, etc.
- SIC 0171 All berry crops.
- SIC 0172 Grapes.
- SIC 0175 Deciduous fruit trees.
- SIC 0711 Only professional pesticide applicators contacted.
- SIC 0721 Only soil fumigators in this SIC contacted.
- SIC 0811 Timber tracts, Christmas tree growing, tree farms.

[2] "Safety Standards for Agriculture," Chapter 296-307 of the Washington Administrative Code (WAC).

The following sectors were among those not targeted in the survey because use of covered pesticides was expected to be minimal[3]:

- SIC 0111 Wheat.
- SIC 0115 Corn.
- SIC 0119 Grains not elsewhere classified.
- SIC 0161 Vegetables.

Due either to misclassification when the employer's original account was created or to a change in crop composition after the account was established, some firms in the above industries were included in the survey. Furthermore, some of those firms reported that they used covered pesticides at levels that would trigger monitoring by the rule. Based on the information provided, their SICs were corrected, and they were included in the analysis.

This survey data was organized into the following sectors for analysis:

- SIC 0721 (professional applicators) was analyzed separately because of its unique characteristic of contracting for other sectors.
- SIC 0175 (orchards) was analyzed separately because of its unique characteristics of being the heaviest user of pesticides in agriculture.
- SICs 0111, 0115, 0119, 0134, 0139, 0161, 0171, 0172, and 0811(henceforth called 'Other Growers') were analyzed together as they were found to be less frequent users of pesticides than the orchard industry. Furthermore, due to the low number of respondents in these sectors, greater statistical reliability is achieved by aggregation.

The Gilmore Group, based in Seattle, Washington, conducted a phone survey in February and March 2003 using lists of large and small agricultural businesses by SIC provided by the department. The Gilmore Group randomly selected specified numbers of businesses in each subcategory. The ***key*** questions asked of the survey participants were as follows:

1) Do you use pesticides in your business?
2) What are the 4 main crops grown by your business and their associated acreages (growers only)?
3) In a typical growing season, how many handlers do you have that handle these pesticides?
4) What is the average hourly wage of these handlers?
5) Positive respondents to the question 3 were asked for the number of handlers handling pesticides for each month of the year at the following levels of exposure durations:
    - 30 to 60 hours
    - 61 to 100 hours
    - 101 or more hours
6) Do you currently conduct cholinesterase monitoring of your handlers that handle pesticides?
7) What were the results of the monitoring?

[3] In addition to the SIC codes mentioned here Chapter 296-307 WAC also specifically applies to the following SIC codes, although use of the covered pesticides in these industrial sectors is likely to be either nonexistent or infrequent: 0133, 0173, 0179, 0181, 0182, 0191, 0211, 0212, 0213, 0214, 0219, 0241, 0251, 0252, 0253, 0254, 0259, 0271, 0272, 0273, 0279, 0291, 0711, 0722, 0751, 0761, 0831, 0851.

8) Are reassignment positions available for handlers removed from pesticide handling for up to 60 days?
9) How far is your business from the nearest medical clinic or facility that you use?
10) To determine the probable firm response to the proposed rule by changing work assignment or making other modifications to fall below the monitoring threshold, the survey asked the following question: If the rule requiring mandatory cholinesterase monitoring of handlers is eventually adopted, please select the response or a combination of the following responses for how you plan on complying with the rule. Please listen to all the choices before answering.
    a. Discontinue the use of these pesticides altogether on my crops.
    b. Have owners or family members apply the pesticides.
    c. Contract with a professional pesticide applicator and let them deal with the monitoring requirements.
    d. Use regular handlers to handle the pesticides but have them handle the pesticides for time periods below the threshold that would trigger the medical monitoring requirement.
    e. Use regular handlers over time periods above the threshold that would trigger the medical monitoring requirement and follow the medical monitoring requirements of the rule.
    f. Other, please specify _____

COST ESTIMATES & ASSUMPTIONS BY CATEGORY

For each set of employer costs resulting from the proposed rule, L&I calculated costs using the data available from the survey and from other sources (as noted in the text), which L&I believes represent the best available data. In developing these costs, L&I used a set of reasonable assumptions to generate a most probable central value. In each case, alternative assumptions that would provide both a low and a high estimate are also provided. These assumptions are described in detail below and summarized in Table 5 on page 14.

Number of Employees Affected.

In each set of costs, one of the important assumptions for both the first and second year costs involves the number of handlers affected by the medical monitoring requirements of the rule. A number of factors must be considered in this determination.

First-year coverage. When the phone survey was designed and executed, the medical monitoring thresholds to be included in the proposed rule had not been determined. Therefore data on monthly exposures in the following ranges were queried in the survey:

- 30 to 60 hours;
- 61 to 100 hours;
- and over 100 hours.

In addition, the survey responses identify the number of employees who handle pesticides but never exceed the 30-hour threshold.

The proposed rule covers employees at 50 or more hours exposure in the first year and 30 or more hours during the second year. While the survey provides information directly applicable to the second year threshold, the first year costs must be extrapolated from the survey results based on reasonable assumptions about the number of employees who handle pesticides more than 50 but fewer than 60 hours. L&I used the available data to develop statistical models (one each for small business and the largest 10 percent of businesses). This allowed L&I to estimate the distribution in each industry sector in 10-hour increments, providing a central value for the 50 to 60 hour range. The low estimate was calculated at 75 percent of the central value, while the high estimate was calculated at 125 percent of the central value. This assumption has no effect on costs from the second year forward.

Inconsistent Survey Responses. Slightly fewer than 10 percent of the respondents gave inconsistent responses to the questions: "In a typical growing season, how many handlers do you have that handle these pesticides?" and "Number of employees handling pesticides 30-60 hours (61-100 or 100+) during (each) month." For example, if a firm reported a total of 2 handlers, but then later said that 2 handlers worked at both the 30-60 and 61-100 exposure levels in July, this would result in a total of 4 handlers in July, twice the total number of handlers the firm reported overall. In this example, L&I developed the central value by excluding the 2 users at the 30 to 60-hour interval, leaving 2 handlers at the 61 to 100 level as the most likely number. The low value reflects the same assumption, while the high value assumes that the sum of the monthly count (in this example 4) is the correct number. The alternative to this would be to discard the inconsistent data, which is inappropriate given the correctible nature of the probable error and the effect discarding such data would have on the ability to evaluate relative costs in the Commercial Applicator sector (where one of the three larger employers responding to the survey gave inconsistent responses).

Impact of reduced need for "periodic testing". The rule provides reduced requirements when handlers are using only carbamates. It may also reduce requirements when handlers use closed systems to mix and load. In such cases, the need for periodic testing (beyond the baseline) could be reduced or eliminated. However, L&I does not have reliable data on the degree to which either situation occurs, and even less ability to determine the degree to which it will occur if and when the rule is in place. Therefore, the current analysis assumes that all handling hours will be covered by the periodic testing requirement, which is likely to overstate the cost of the rule to at least some degree.

Impact in Shift of Pesticide Application Practices. Similarly, one of the questions on the survey asked about shifts in behavior or work assignment that would reduce the number of handlers affected by the medical monitoring requirements in the proposed rule. Although such a shift was predicted by a meaningful number of respondents (see Table 2), this analysis does not reflect the resulting reduction in employer costs. Instead, it treats the cost of the shift as essentially identical to the cost of complying without any change in work assignments.

This clearly overstates employer costs. Employers would not be likely to change unless they believed that the net cost of such a change would be lower than the cost of complying without such changes. However, no data is available to allow L&I to estimate the cost of the alternatives chosen by the respondents, making the conservative approach described above appropriate.

Table 2: Reported Change in Pesticide Application Practices (Survey Response)*

	Discontinue Pesticide Use	Owner or Family Will Apply	Use Professional Applicator	Keep Hours Below Threshold	No Change
Professional Applicators					
Small Business	0%	52%	0%	62%	7%
Largest 10 Percent	0%	0%	0%	100%	33%
Orchardists					
Small Business	0%	54%	0%	49%	5%
Largest 10 Percent	0%	4%	0%	61%	21%
Other Growers					
Small Business	5%	5%	43%	33%	10%
Largest 10 Percent	8%	0%	8%	75%	17%

*Totals may exceed 100 percent because respondents were allowed to select more than one response.

Calculations of the number of handlers affected by the medical monitoring thresholds each month are discussed in "key data concepts" on page 15.

Cost of Wages and Benefits

At several points, estimated wage costs are used. Estimated handler wages were calculated using employer responses to the survey to generate average wage estimates, as shown in Table 3.

Table 3: Average Hourly Wage Estimates (without benefits) by Industry Sector

	Small Business	Larger 10 Percent
Professional Applicators	$12.86	$12.25
Orchardists	$8.73	$8.37
Other Growers	$9.10	$10.20

Estimated wage costs for managers, supervisors, and administrative/clerical staff were used to develop costs of recordkeeping and training.

In all cases, wage calculations have been adjusted to reflect the following additions to the basic wage[4]

- Federal Social Security/Medicare 7.65%
- State Unemployment Insurance 3.61%
- Federal Unemployment Insurance 0.80%
- State Workers Compensation 3.72%

Total Adjustment for Benefits 15.78%

Based on the information available and the nature of the employment relationships, the analysis assumes that there will be no additional benefit costs (for example, resulting from employer-provided medical insurance or pension benefits).

[4] The estimate was not adjusted to reflect slight variations in occupation rates or modifications based on employer-specific experience.

Recordkeeping Costs.

The central estimate for the recordkeeping cost per firm is the sum of three components:

(1) initial recordkeeping setup costs, using materials generated by L&I and estimated by L&I at 20 minutes of a field foreman's time per business;

(2) costs of recording the hours for pesticide handlers each month, estimated at 15 minutes per-handler month recorded; and

(3) minimal costs for recordkeeping materials supplies.

- In the central estimate, the wage for the field foreman or other senior employee keeping records was estimated at $20 per hour, plus 15.78 percent in benefits.
- The low estimate assumes that a lower paid administrative or clerical employee keeps the records at an estimated wage of $12 per hour, plus 15.78 percent in benefits.
- The high estimate assumes that the owner or a manager keeps the records, with an estimated hourly wage of $30, plus 15.78 percent average cost of benefits (although some of these benefit costs would not necessarily be paid if the records were being kept by the business owner).

Training Costs.

Training costs consist of the sum of four components:

(1) the cost of the trainer setting up the training;

(2) the cost of the trainer to conduct the training;

(3) the cost of the handler's time; and

(4) costs for training materials.

The analysis assumes that the field foreman (or equivalent) will be the trainer, and that he or she will spend one hour setting up the training and one half hour conducting it. The employees will spend one-half hour each attending the training (handler wages are based on responses to the survey and are reflected in Table 3). Training material costs are estimated at $10 per employer.

- The central estimate assumes that at least half (50 percent) of these employees will return in the second year, based on consistent descriptions of these workers in stakeholder and public meetings as being "highly valued" and "stable" members of the employer's workforce. This will reduce second year training costs accordingly (and would also mean that costs in future years would be somewhat lower than those in the second year). It also assumes that an employer's handlers can typically be trained as a group.
- The low estimate assumes that 75 percent of employees will be returning in the second year.
- The high estimate assumes that only 25 percent of employees will return in the second year. In addition, it assumes that the field foreman must train each employee separately, increasing his or her time spent providing the training.

Baseline Testing Costs.

The baseline testing costs are the sum of the following:

(1) initial identification and selection of the medical provider;

(2) clinical fees (including an initial fee for first clinic visit by each handler);

(3) laboratory analysis costs;

(4) cost of handler wages

(5) mileage.

The costs will also be affected by the employee participation rate and the number of employees who return to the employer in the second year.

Employee Participation. A certain number of employees can be expected to decline participation in the medical monitoring after discussing it with the medical provider. Employees who do not participate will eliminate the laboratory costs and the costs of clinical evaluation of the test.

- The central estimate assumes that the employee participation rate will be 85 percent, based on consistent advice from stakeholders anticipating a relatively high non-participation rate.
- The low estimate assumes a 75 percent employee participation rate.
- The high estimate assumes a 95 percent employee participation rate.

Returning Employees. Many employees will return to the same employer in later years. Such employees will not repeat the initial clinic visit in the second year (or in subsequent years).

- The central cost estimate assumes that 50 percent of the employees who receive a baseline in the first year will return to the same employer (and medical provider) in the second year.
- The low estimate assumes that 75 percent of handlers will return in the second year.
- The high estimate assumes that only 25 percent of handlers will return in the second year.

Provider Costs. Medical provider costs have been developed based on a determination of the time necessary to identify and select a provider, as well as the provider's clinical fees. Based on information from medical providers, the analysis includes an estimated $112 initial clinic fee for the first clinic visit for each employee, and an estimated $38 clinical evaluation fee for each test.

- The central estimate assumes one hour of a manager's time would be necessary to identify and establish the relationship with a medical provider.
- The low estimate assumes that employers will be able to select from a meaningful number of medical providers identified and trained by L&I, reducing the manager's time in initial selection to ½ hour.
- The high estimate assumes that selection will take one hour of a manager's time.

Laboratory Costs. Estimated initial baseline test costs have been developed from data the department has collected from clinics and from employer responses to the survey.

- The central estimate reflects a belief that L&I will be able to negotiate lower laboratory costs for the first year, establishing a new benchmark for future analyses (the costs of which would be likely to decrease due to volume in any case). For this reason, the average reported costs for RBC and plasma ChE tests of $60 with a $10 handling fee have been estimated at $45 and $10 for the first year and $50 and $10 for the second year.
- The low estimate assumes that the second year laboratory analysis rate will remain at the estimated $45 with a $10 handling fee.

- The high estimate assumes that laboratory analysis costs will reflect the average current reported costs ($60 with a $10 handling fee).

Wage and Travel Costs. Mileage reimbursement and employee wages for all three estimates are based on responses to the employer survey.

Periodic Testing Costs.

The periodic testing costs are the sum of the following:

(1) clinical fees;
(2) laboratory analysis costs;
(3) cost of handler wages
(4) mileage.

The costs also will be affected by employee participation rates.

Employee Participation. Employee participation assumptions are explained under the baseline testing, above. Employees who do not participate will eliminate the costs of periodic testing.

Provider Costs. An estimated $38 clinical evaluation fee would apply for each test.

Laboratory Costs. Estimated periodic test laboratory costs are identical to those explained under baseline testing, above.

Wage and Travel Costs. Mileage reimbursement and employee wages for all three estimates are based on responses to the employer survey.

Frequency of Monitoring. In all cases, the frequency of periodic monitoring is based on the monthly data reported by the employer survey. As discussed on pages 8 and 9, it has not been adjusted to reflect the reported changes in behavior or work assignment by employers to reduce the number of handlers reaching the threshold level.

Work Practice Investigation.

While the proposed rule requires work practice investigations for handlers that have certain depressed cholinesterase levels found by periodic monitoring, this would not impose more than minimal costs on businesses. Employers are already required to be aware of hazardous conditions in their workplaces, and the monitoring results will actually provide them better information to meet their current obligations to identify and correct hazards.

Therefore, the costs of the specific requirement to analyze work practices following an identified depression will be minimal and are not otherwise reflected here.

Medical Removal Costs.

The cost of medical removal is based on the time the employee is reassigned or removed from work completely, multiplied by the average wage and benefits. In order to calculate the cost of medical removal, it is necessary to estimate how frequently depressions requiring such removal will occur. It is also necessary to determine how frequently employees will be removed rather than reassigned to new duties. In addition, it is necessary to determine the "cost" of reassignment (as opposed to removal from useful work). In each case, it is necessary to determine how long removal will last when it does occur.

Frequency of Medical Removal. The California's Department of Pesticide Regulation found that 4.8 percent of workers tested had ChE values below the threshold level (Ames, et al, Cholinesterase Activity Depression Among California Agricultural Pesticide Applicators, American Journal of Industrial Medicine, 1989). The removal thresholds used in California at that time were 10% lower than those in the proposed Washington rule. However, the group was not necessarily representative of the exposures addressed by this rule.

In contrast, the seven Washington growers and one Washington applicator who reported in the survey that they conduct voluntary ChE testing reported no depressed ChE levels. This could have provided a basis for an even lower estimate of removal frequency. However, the details of this monitoring were not reported (number of handlers monitored, testing procedures and exposure durations triggering monitoring). Therefore, this data, while suggestive, cannot be assumed to be fully representative of the populations monitored if the proposed rule is adopted.

L&I reviewed this information and considered stakeholder comments about the increased use of closed systems, reductions in the use of the most hazardous pesticides, the more stringent worker protection requirements in place today compared to 1989, and the employer incentive to avoid the cost of removal created by the medical removal protection requirement itself. Based on this review, L&I has concluded that the 4.8 percent removal rate is a high range and that the likely range can be expected to approach half that rate.

- The central estimate assumes a 3.0 percent removal rate.
- The low estimate assumes a 1.2 percent removal rate.
- The high estimate assumes a 4.8 percent removal rate.

Additional Medical Tests. In all scenarios, the analysis assumes that two additional periodic tests will be required before the employee is restored to full work status.

Wage Costs. Employee average wages are based on employer survey information, calculated against an estimated 55-hour work week, which is based on stakeholder information about the length of the work week during peak seasons. In addition, the employer survey provides an estimate of the availability of jobs into which employees can be reassigned.

- For the central estimate, L&I assumes that when reassignment occurs another employee will be assigned the duties of the pesticide handler. The estimate also assumes the reported reassignment jobs have full value to the employer, so that the cost to the employer will be accurately reflected by an estimated $2 per hour in additional wages to pay another worker to take on the higher level duties normally performed by the pesticide handler.

  The central estimate also assumes that employees for whom reassignment jobs are not readily available will be removed entirely, requiring employers to pay their wages and benefits without receiving any offsetting reduction in other costs.
- The low estimate makes the same assumptions about the cost of reassignment but also assumes that many employers who do not have reassignment jobs readily available will find reassignment jobs to avoid absorbing the complete cost of medical removal. Based on this assumption, and recognizing that such jobs are not likely to have full value to the employer, the low estimate reduces the cost of removing those employees by 25 percent.
- The high estimate assumes that the reported reassignment jobs have only minimal value to the employer and therefore calculates 75 percent of the reassigned employee's wages and benefits as a cost of compliance with the rule. It also assumes that employees for whom reassignment jobs are not readily available will be removed entirely.

Duration of Removal. The only clear indication for the estimated length of time for a medical removal period that could be found in the medical literature is an average of 3.5 weeks reported by Lessenger & Fillmore[5].

In this study the results of data on 100 workers who had ongoing cholinesterase monitoring were evaluated. Twenty-four workers were temporarily removed from exposure due to cholinesterase depression of greater than or equal to 40% for plasma cholinesterase or greater than or equal to 30% for RBC cholinesterase. These workers were returned to handling duties when their cholinesterase levels returned to within 20% of the baseline. The shortest time an employee was removed from exposure was 1 day. The longest removal period was 119 days. Removing these outliers from the calculation, it is reasonable to expect a 22-day average removal period. This 22-day removal has been used for all scenarios.

Table 4 summarizes the various assumptions described in the preceding pages.

Table 4: Summary of Parameters of High-Central-Low Estimates

	High	Central	Low
Recordkeeper Wage	$30 plus 15.78%	$20 plus 15.78%	$12 plus 15.78%
Trainer Wage	$30 plus 15.78%	$20 plus 15.78%	$20 plus 15.78%
Training Format (Group or Individual)	Individual	Group	Group
Handlers Returning in 2nd Year	25%	50%	75%
Handler Participation in Medical Tests	95%	85%	75%
Laboratory Costs (1st Year)	$70	$55	$55
Laboratory Costs (2nd Year)	$70	$60	$55
Manager Time to Select Provider	1 hour	1 hour	½ hour
Medical Removal Rate	4.8%	3.0%	1.2%
Medical Removal (w/o Reassignment)	Wages plus 15.78%	Wages plus 15.78%	75% of wages plus 15.78%
Medical Removal (with Reassignment)	75% of wages plus 15.78%	$2 plus 15.78%	$2 plus 15.78%
Discrepancy Between Handler Counts	Use Monthly	Use Annual	Use Annual
Handlers in 50- to 60-hour Group (1st Year)	125% of Central Estimate	Estimated Distribution	75% of Central Estimate

[5] Lessenger and Fillmore, "A Cholinesterase Testing Program for Pesticide Applicators," *Journal of Occupational Medicine*, 1993.

KEY DATA CONCEPTS

Average number of employee months of pesticide handling per month (or year) for handlers exceeding threshold durations.

This statistic is determined by aggregating the number of handlers monitored during any month of the year. For example, if a firm has six handlers exposed at the 30-hour level in one month, then this results in 6 employee months of monitoring. If this happens in each of three months then this results in 18 employee months of exposure. This is calculated for 30-60 and 60+ levels of exposure for small and large firms and by sector. This statistic is used to calculate the number of periodic tests for average size firms and to estimate the number of medically removed handlers (the use of the 60+ data to estimate exposures at the 50+ threshold in the first year is described on page 8.

Table 5 shows the results of this calculation for each of the groups being analyzed.

Table 5: Average Handler Months Above Monitoring Thresholds (Average per Employer with Employees Handling Covered Pesticides at Any Level)

	First Year		Second Year	
	Small	Large	Small	Large
Professional Applicators	2.91	17.81	4.10	22.00
Orchardists	0.97	6.99	4.08	18.96
Other Growers	0.32	1.24	0.68	3.33

L&I does not have survey or other direct data showing pesticide handling on a monthly basis for those firms not expected to exceed the 30-hour threshold (which is relevant in estimating the recordkeeping costs. However, the analysis assumes a monthly distribution similar to that found in the 30 to 60 hour range.

Small Company Considerations.

Small businesses are defined by the Regulatory Fairness Act[6] as businesses with fewer than 50 employees (more precisely, this analysis calculates the number of "employees" using full-time equivalents, or 2000 worker hours, as the best indicator of relative employer size). Costs for these small employers are compared to the costs for the largest 10 percent of all employers in each industry sector. In each sector, however, the largest 10 percent of employers includes at least some small businesses; in such cases, the employers who could have been counted in both groups were included in the largest 10 percent and excluded from the small business calculations.

[6] "'Small business' means any business entity, including a sole proprietorship, corporation, partnership, or other legal entity, that is owned and operated independently from all other businesses, that has the purpose of making a profit, and that has fifty or fewer employees." RCW 19.85.020(1)

CONCLUSIONS

Potential for Disproportionate Impact

Using a per covered handler comparison (as the most reasonable basis), L&I has analyzed the potential disproportionate impact[7] on small businesses in each of the three industry sectors. Table 6 (identical to Table 1 in the Executive Summary) summarizes the findings for the first and second years the rule would be in effect.

Table 6: Central Cost Estimates by Industry Sector

	First Year		Second Year	
	Per Firm	Per Handler	Per Firm	Per Handler
Professional Applicators				
Small Business	$892	$517	$1218	$706
Largest 10 Percent	$4532	$504	$5511	$612
Small +/- Larger		+2.6%		+15.4%
Orchardists				
Small Business	$346	$169	$956	$466
Largest 10 Percent	$1786	$205	$4034	$463
Small +/- Larger		-17.6%		+0.6%
Other Growers				
Small Business	$217	$165	$315	$239
Largest 10 Percent	$553	$144	$1023	$267
Small +/- Larger		+14.6%		-10.5%

Based on this information, there appears to be a disproportionate impact on small business in the professional applicator sector, beginning in the second year (although the combined two-year net present value analysis of the impact is less conclusive, as discussed in more detail below). In the Other Growers sector, there is a disproportionate impact in the first year alone, apparently because of a relatively small distribution of small businesses who are moderate users of the covered pesticides. However, from the second year forward, the relative impact is greater on large businesses in the Other Growers sector. In Orchards, there does not appear to be a large enough variation to describe it as a disproportionate impact.

In two of the industry sectors (Orchardists and Other Growers), the relative impact on small business would be even lower if the analysis reflected those businesses who do not used covered pesticides and therefore will not be affected by the rule in any way.

Table 7: Percentage of Employers With Employees Using Covered Pesticides at Any Level

	Small Business	Largest 10 Percent
Professional Applicators	94%	100%
Orchardists	39%	97%
Other Growers	22%	48%

[7] The Regulatory Fairness Act does not provide a precise threshold for comparison. For the particular purposes of this analysis, a disproportionate impact on small business was considered to exist if the estimated cost per covered pesticide handler was more than 10 percent greater for small business than for the largest 10 percent of businesses in the same industry sector. However, this assumption did not have a meaningful effect on the conclusions of the analysis, since no central value comparative impacts above 1 percent were found other than those in the professional applicators. In addition, L&I mitigated impacts across all sectors, in spite of the absence of a disproportionate impact in some cases.

The central cost analysis is presented in a somewhat different way in Table 8, which reflects the "net present value"[8] impact of the proposed rule for a two-year period.

Table 8: Two-Year Cost Using Net Present Value (Central Estimate)

	Small Business	Largest 10 Percent	Small +/- Larger
Professional Applicators			
Per Firm	$2014	$9595	
Per Handler	$1168	$1066	+9.6%
Orchardists			
Per Firm	$1237	$5536	
Per Handler	$603	$635	-5.0%
Other Growers			
Per Firm	$508	$1501	
Per Handler	$385	$392	-1.8%

This NPV analysis appears to confirm that there is no disproportionate impact in the Orchardists and Other Growers sectors, using the 10 percent comparison threshold (and the conclusion would be unchanged even if a much lower comparison threshold was used). Although the central two-year NPV calculation for professional applicators also finds a variation of just under 10 percent between small and larger businesses, the second-year costs of the rule are more indicative of future costs of the rule as proposed than are the first-year costs, which are based on a higher initial medical monitoring threshold. In addition, the high and low NPV estimates found in Tables 9 and 10 confirm a disproportionate impact in the professional applicators sector. For these reasons, L&I believes it appropriate to attempt further mitigation. And L&I will apply such mitigations across all three sectors, regardless of whether a disproportionate impact has been found in each case.

Tables 9 and 10 reflect the High and Low NPV Estimates, respectively.

Table 8: Two-Year Cost Using Net Present Value (High Estimate)

	Small Business	Largest 10 Percent	Small +/- Larger
Professional Applicators			
Per Firm	$3205	$16,751	
Per Handler	$1603	$1396	+14.8%
Orchardists			
Per Firm	$1890	$9335	
Per Handler	$898	$968	-7.2%
Other Growers			
Per Firm	$767	$2224	
Per Handler	$496	$494	+0.4%

[8] "Net present value," or NPV, allows comparison of current and future costs. For the purposes of this analysis, the net present values were calculated using a 3 percent discount rate to the summer of 2003. Effectively, this relatively conservative discount rate reduces first-year cost estimates by 2.91 percent and reduces second-year costs by 5.74 percent. This is not simply an adjustment to reflect expected inflation. Standard economic analysis requires the use of a discount rate for businesses in order to incorporate the time value of money and the associated opportunity costs, even though inflation in the associated costs to businesses may not increase over the time period in question. However, the NPV calculation has no effect on comparisons by business size within a give year, and it is unlikely it would have any effect on overall disproportionate impact determination except in extraordinary circumstances. In any case, the figures in Table 6 reflect the cost estimates before being adjusted to reflect NPV.

Table 10: Two-Year Cost Using Net Present Value (Low Estimate)

	Small Business	Largest 10 Percent	Small +/- Larger
Professional Applicators			
Per Firm	$1467	$6601	
Per Handler	$851	$733	+16.1%
Orchardists			
Per Firm	$947	$4521	
Per Handler	$461	$519	-11.2%
Other Growers			
Per Firm	$408	$1275	
Per Handler	$310	$333	-7.0%

Mitigations of Apparent Disproportionate Impact on Small Business

L&I recognized the possibility of a disproportionate impact, and the proposed rule contains several mitigations to reduce the immediate impact of the rule on small businesses without compromising worker protection. These mitigations include the following:

- L&I has proposed a phase-in of the lower medical monitoring threshold, which substantially reduce the first-year impacts on small businesses (and to a much greater degree than they will reduce the impacts on larger businesses in two industry sectors, as reflected by the first-year numbers in Table 6).
- L&I will provide educational resources, including model employee training and related written materials, to reduce the administrative burden of the rule on small employers.
- L&I will work with the Washington State Department of Agriculture (WSDA) to develop recordkeeping materials that can be used for the requirements of this rule and for existing Worker Protection Standard recordkeeping requirements.
- L&I will work with the Washington Department of Health (DOH), the University of Washington (UW) and others to identify medical providers interested in providing medical monitoring activities. L&I will provide training to such providers and make their names available to growers, enabling growers to select from among such providers with a minimum of effort and to be assured that the providers are aware of the requirements of the rule and their responsibilities under it.
- L&I will work with employer representatives (including representatives of small businesses) and others to analyze the results of the rule during the first year and to consider modifications in the rule as appropriate.

In addition, L&I plans to take the following additional steps (not otherwise reflected in the rule or in this SBEIS) to provide further mitigations of the rule's impact on small businesses, especially in the professional applicator sector.

- L&I will use its existing consultation resources in a targeted effort to provide direct on-site assistance to employers to determine the most efficient and effective ways to comply with the rule.
- L&I will work with employer associations and other organizations to identify opportunities for targeted outreach efforts to assist employers who do not wish to have an on-site consultation to identify the most efficient and effective ways to comply with the rule.
- L&I's penalty calculations result in substantial reductions in any penalties to small businesses for violations that are identified and cited under WISHA.

L&I welcomes any suggestions for further mitigations of the rule's disproportionate impact that may be possible without compromising the protection of worker health and safety under whatever rule may be adopted. L&I will make a final decision on adoption of the rule, as well as any modifications to the proposal, after the public process and after further discussions with small business representatives and other stakeholders about the rule and its implementation.

Summary of Overall Impacts

Overall, L&I expects the recordkeeping requirements of the rule to apply to an estimated 4800 handlers employed by 1700 businesses. Of these, the rule will require that medical monitoring be offered to an estimated 1100 handlers in the first year and an estimated 3000 handlers beginning in the second year. The department estimates a total cost of just over $925 thousand for the first year and just over $2 million beginning in the second year. After adjusting the costs for each year to reflect the current value of the money (the "net present value") to provide a consistent basis for comparison, the total two-year cost of the rule for all affected employers will be an estimated $2.8 million.

L&I has considered whether the rule's requirements will cause businesses to lose sales or revenue not otherwise reflected by the costs of the rule already discussed.[9] There appears to be no basis for concluding that such losses will occur – the rule is not expected to degrade product quality, delay production, or otherwise affect the ability of affected employers to sell their products and services. In addition, the proposed rule's impacts, when compared to a 2001 annual crop value in the affected industry sectors of more than $3.7 billion,[10] are likely to be minimal.

[9] This is distinct from the possibility that a business may choose to discontinue activity or otherwise make changes in order to avoid the rule's costs – this impact is already reflected by the cost analysis described in the bulk of this document.

[10] Data from the Washington Agriculture Statistics Service, 2002 Annual Bulletin.